

# **Preliminary Feasibility Analysis: Biomass from forestry operations to compensate for the construction of a third runway at Malpensa**

**(Opportunity to build a biomass plant for energy purposes)**



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ERSAF: Structure Evaluation of the countryside and green systems

### *Introduction*

The Lombard Park of the Ticino Valley is a Regional Park of Lombardy. Born in 1974 on a popular initiative, the Park of Ticino's main objective is the protection and conservation of the river and the natural environment from the impacts resulting from the increasing human activity in the area. The consortium that manages the park consists of 47 provinces and 3 municipalities and controls an area of over 91,600 ha, divided as follows: 22,000 ha of natural land (forests), 47,200 ha of cultivated land and 21,740 ha of urbanized areas. The park is characterized by a high degree of biodiversity known as the UNESCO "Man Biosphere Reserves."

Thanks to the strategic location between the provinces of Milan, Pavia and Varese, the Ticino Park has become a major player in the implementation of local development policies.

In the Park are located several hydroelectric power plants, an important thermal power plant (1,740 MW) and the Malpensa intercontinental terminal.

The task of the park is to harmonize the need for a secure environment with that of a socio-economic development of the population that inhabits it, in what is the most populated area in Italy.

The Ticino River is not only a green lung in an area of high human activity and industrialization, but also a natural corridor that connects for a hundred kilometers, the foothills of Lake Maggiore to the Po with a significant variety of landscapes, animals and plant species.

### **Area of Interest**

The Milan-Malpensa Airport "Milano City" occupies portions of the municipalities of Cardano al Campo, Somma Lombardo, Casorate Sempione, Ferno, Lonate Pozzolo, Samaria and Vizzola Ticino, all relating to the province of Varese, taking its name from the nearby town of Malpensa, Somma Lombardo fraction.

Its location within the Parco Lombardo of the Ticino Valley has marked the development of trails and associated facilities.

The Regional Law 10, 12/04/1999 "Plan of the Malpensa Area. Special rules for the intercontinental airport Malpensa 2000" established a special plan for the development of the airport. At the same time, the Ticino Park has published an essay entitled "Monitoring of the ecosystems component of the area of Malpensa" means by which it was possible to identify the environmental, landscape and ecosystem aspects which were of relevant and indispensable value and simultaneously define the less sensitive areas on which to place the appropriate new infrastructures needed to develop the airport.

Following the expansion of the Malpensa airport, which had become necessary to make it suitable also for being one of the largest airports in Europe, which affected particularly the southern area of the airport itself, was necessary to create an ecological corridor which can maintain and enhance the natural permeability of the forest areas of the river valley of the Ticino and the moors of Lonate Pozzolo.

In the eastern area of the building there are in fact, some of the most interesting areas of heath of the entire Lombardy Region and of Northern Italy, consisting of a large area characterized by the typical vegetation of the acidophilus lands (Scots pine, birch, heather and broom) interspersed with interesting formations oak-hornbeam typical of the climax of the lowland.

## Analisi preliminare di fattibilità: biomassa forestale dagli interventi compensativi per la realizzazione della terza pista dell'aeroporto di Malpensa

To the west of the infrastructure, after a few hundred meters characterized by grassland and arable land, you reach the edge of the main river terrace from where, with a steep drop of 30 meters, it is possible to reach the active bed of the Ticino River. This area is characterized by large forests of predominantly type xerophilous.



*Location of the ecological corridor of Tornavento from "Strategic Environmental Assessment of the development programs of the transport system" - Parco Lombardo Consortium of the Ticino valley - 2007*

In order to mitigate the negative consequences on local ecosystems due to the completion of the new SS 336, an artificial ecological corridor that runs from the Ticino river moors Lonate Pozzolo was therefore created, thus ensuring an environmental continuity.

# Analisi preliminare di fattibilità: biomassa forestale dagli interventi compensativi per la realizzazione della terza pista dell'aeroporto di Malpensa



## TAVOLA 7 - RETI ECOLOGICHE E VALENZE LOCALI

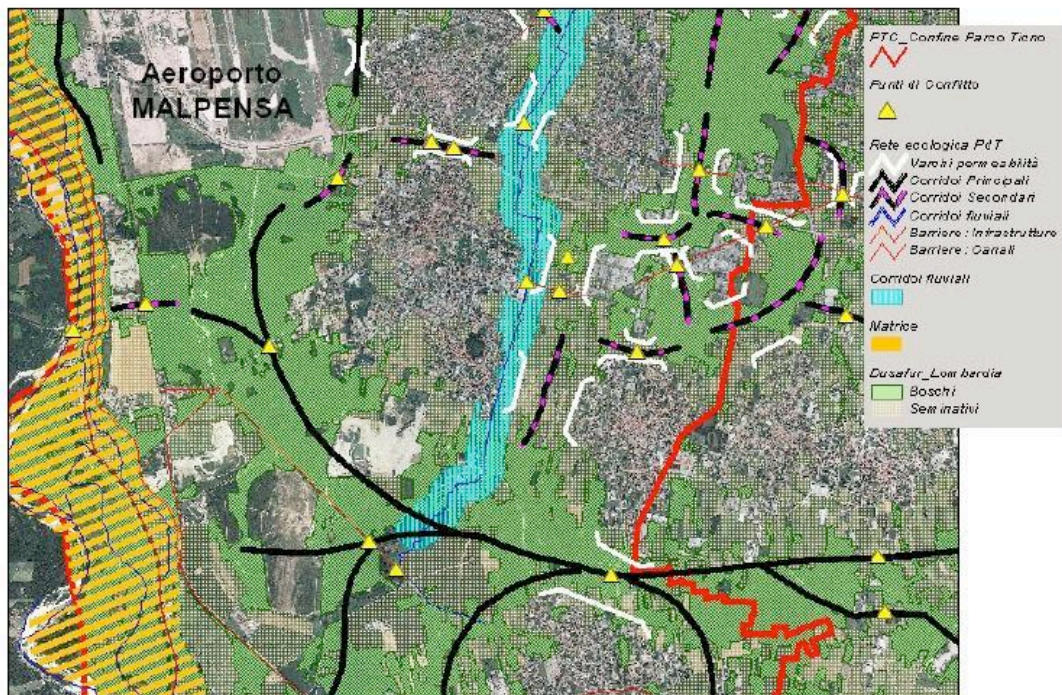
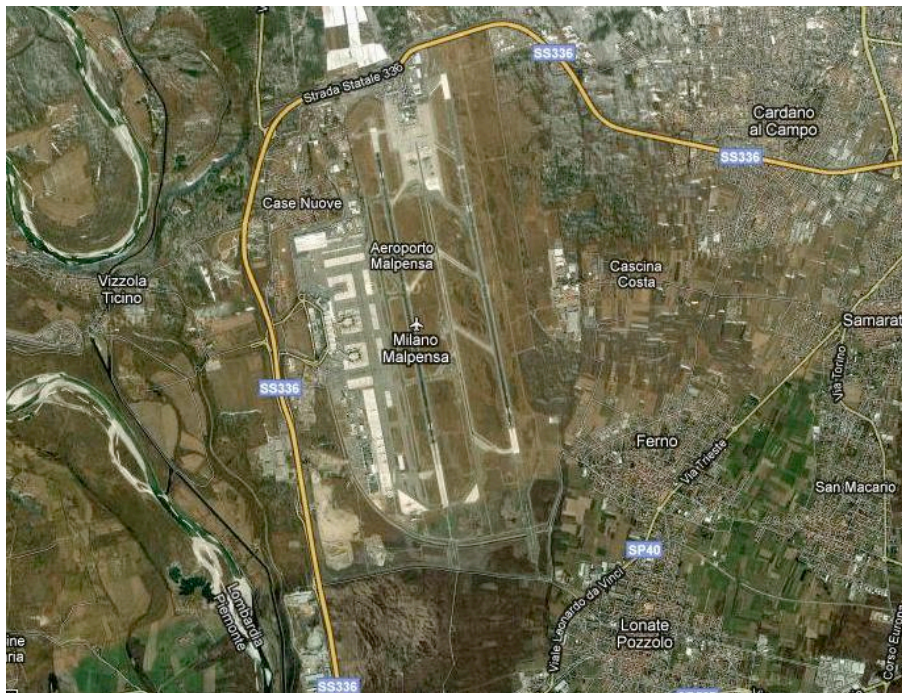


Tavola 7 – reti ecologiche e valenze locali (All.1 VAS del parco Lombardo Valle del Ticino, 2007)

In the same area covered by the previous environmental mitigation action, the SEA, the airport management company established by the City of Milan (84.56%), ASAM (14.56%) and small shareholders (0.88%), decided including it in its business plan, the construction of a third runway and getting the go-ahead by ENAC.



Analisi preliminare di fattibilità: biomassa forestale dagli interventi compensativi per la realizzazione della terza pista dell'aeroporto di Malpensa



Area aeroportuale Malpensa

The realization of this third runway will lead to an estimated reduction of around 300 ha of forest and heath falling in the Ticino Park, west of the ecological corridor.



Valutazione Ambientale Strategica - Rapporto ambientale

Allegato I

TAVOLA 12 - LE PRESSIONI ATTUALI E ATTESE

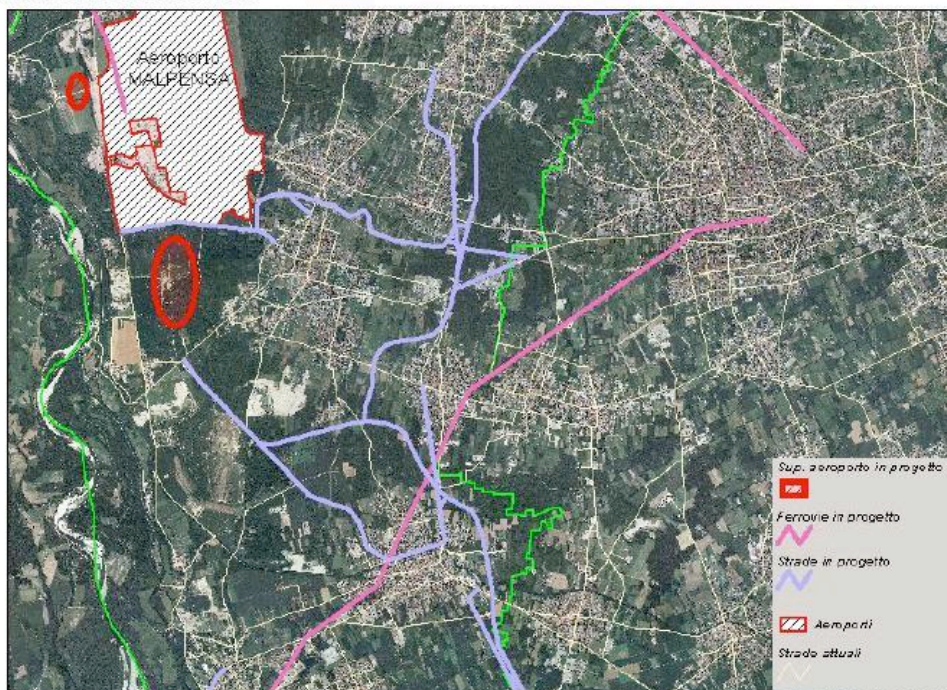


Tavola 12 –The current and expected pressures (VAS All.1 Valle del Ticino Lombard Park, 2007)

As provided by law on the environment and forestry, there will be different aspects which need to be taken into account during implementation.

As established by Dgr n.8/2024 of 8/3/2006 "Applied and detail aspects for the definition of forest, for the identification of irrelevant plant formations and for the identification of the coefficients of woodiness with partial modifications of the dgrn8/675 21/9/2005 "areas on which the third runway will insist on are defined as intensive woodiness, this coefficient in the Province of Varese being equal to 49.82%.

For these areas, then the countervailing actions must be directed to the improvement of existing forests and will consist of thinning, plant cutting, start-up cuts and conversion to timber trees, formation pruning, development and maintenance of VASP and SIF based on criteria of environmental engineering. So for every square meter of wood processed forestry activities shall be made in amounting equal to the "cost of compensation", regardless of the area covered by the intervention. The cost of compensation shall be the cost of the stand (€ 2.2990 / m, DGR 675/2005) plus the cost of land (average agricultural value of the transformed forest) multiplied by the area transformed.

### **Costs of compensation and forestry activities**

As previously mentioned, the surface which will affect the settlement of the third runway of the airport of Malpensa, will be approximately 300 ha, currently occupied by woods and heathland.

Under D.G.R. 8/675/2005 compensatory initiatives "should be made compulsory in Lombardy and in the areas near the forest destroyed." The forestry activities are the only measures of compensation allowed in the areas with high coefficient of woodiness.

Article. 50 of LR 31/2008 defines "forestry activity" all actions, other than the transformation of the forest, on forest management, such as cutting use, thinning, crop care, phytosanitary protection, the actions of creation, maintenance and extraordinary management of agro-forestry and pastoral roads closed to normal transit, the works of hydraulic-forestry, reforestation and afforestation.

Among the countervailing actions, it is better to avoid the actions of " wood cleaning", that is to say the interventions aimed solely at cutting or removal of underbrush or dead, broken or deperienti plants. Such interventions, often unnecessary, may adversely affect the biodiversity of the forest ecosystem and are therefore unlikely to be configured as "environmental compensation". Instead it is possible to displace thinning, plants cutting, phytosanitary cuts, start-up cuts and conversions that are intended to address the evolution of the population towards more stable and ecologically complex forms.

With regard to compensation measures to be implemented, as required by the DGR 8/675/2005, it is also possible to carry out operations aimed at containment of alien species such as *Prunus serotina* and *Robinia Pseudoacacia*.

Overall, we can estimate that the forest upgrades could lead to an average sample of 30 Mk / ha.

The amount of improvement is defined by the cost of compensation:



Analisi preliminare di fattibilità: biomassa forestale dagli interventi compensativi per la realizzazione della terza pista dell'aeroporto di Malpensa

costo di soprassuolo	2,2990 €/mq
Valore Agricolo Medio (*) per bosco misto in Provincia di Varese	1,51 €/mq
<b>costo di compensazione</b>	<b>3,809€/mq</b>

(\*) Valore Agricolo Medio – fonte Agenzia del Territorio, regione agraria n°6 – annualità 2010

Average Agricultural Value – Source: Agency of Territory, Agricultural Region No. 6 - Year 2010

For an area of 300 hectares (3,000,000 square meters) is expected a compensation cost of €. 11,427,000.00 to be invested in forest operations improvement.

From 300 ha of cut that will be made, it is possible to calculate the amount of obtainable wood.

It is estimated in fact to get about 150 cubic meters per every cut hectare.

Then from the cut for the realization of the Malpensa third track, it will be possible to get about 45,000 cubic meters of usable wood, which could be added those coming from compensation operations.

From an energy analysis of the Ticino Park, created in 2006 by the CTI (Italian Heat Technology Committee), which covered all areas of production, distribution and use of various forms of energy (fossil fuels, electricity, renewables) and which allowed us to define a simple energy balance, an essential tool to identify appropriate response actions, it is clear that the park is almost entirely dependent on the outside with regard to primary energy input.

It is possible then to suggest the creation of a wood-energy chain which can use biomass resulting from the implementation of the third runway and of the compensatory measures, for domestic energy.

It can therefore be envisaged the use of this biomass to make energy-independent one of the Park Center in the area through the use of business boilers.

One of the centers that for its location is more likely to benefit from the activation of this sector is the Tornavento Farm, a park center, built in a former Austro-Hungarian customs of Lonate Pozzolo Tornavento rising in Tornavento, on the edge of the river terrace.

The former customs, more recently used as an agricultural dwelling (known as the Parravicino farm), represents an information point of the Lombard Ticino Park.

The Customs was built in 1737 and in the second half of the Nineteenth century was turned into a farm in the service of Parravicino family lands. The farm was abandoned in the late Sixties. Purchased in 1997 by the Park Authority, the farm was completely renovated.

The building of the Park Center is used as an information point and it is made up of an offices area, an exhibition area, a conference room and a library.

The area is estimated at about 700 square meters and it is used mostly during office hours.



## Analisi preliminare di fattibilità: biomassa forestale dagli interventi compensativi per la realizzazione della terza pista dell'aeroporto di Malpensa

The energy balance of the Park Center is now completely dependent on non-renewable fossil fuels (natural gas supply) from outside the park, currently used by a thermal power station with output power of 100 kW. Considering the non-continuous use of the structure, energy consumption for heating is estimated about 60,000 kWh / season, resulting in an annual cost for space heating of about €. 5000.00

In the present case it is assumed that the energy adjustments affect only the heat generating plant because of the recent renovation of the building.

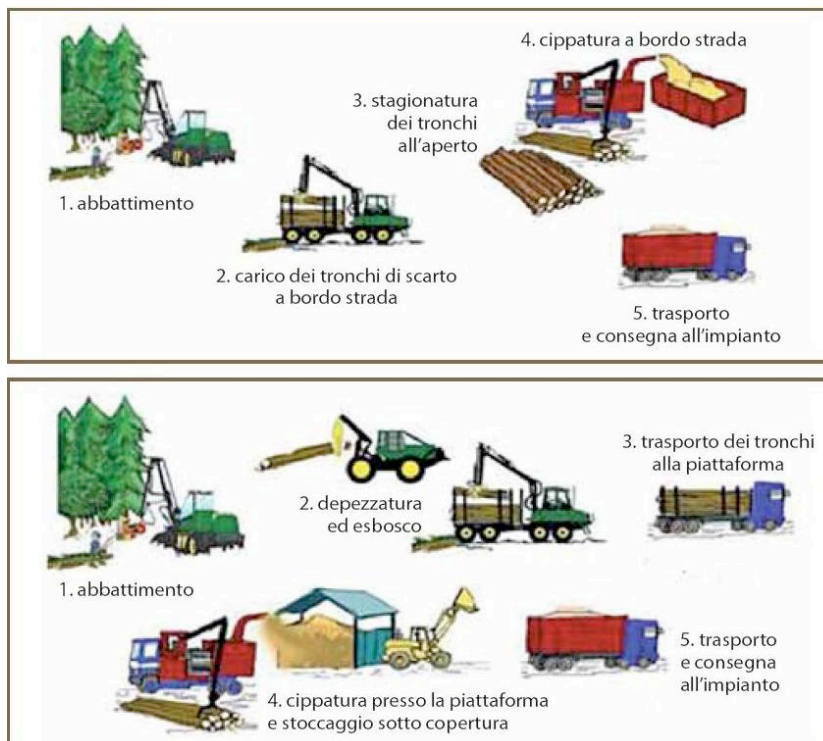
On a theoretical level it can be assumed that, due to the substitution of natural gas plant with a biomass power plant it will be possible to obtain an expenditure reduction of about 15-20%.

The high economic effort required to heat the center of this park, together with the wide availability of wood in the area, make then convenient the construction of thermal plants fueled by wood chips wood.

The raw material from which you can get the woodchips, as stated previously, will be the wood from the deforestation of the area destined to third runway and from the implementation of compensatory measures.

After cutting the wood obtained, characterized by high humidity (50-60%), will be left to mature in designated areas outside the forest for at least one summer in order to reduce to 30% the moisture content of the wood itself, in order to be able to get good quality chips that can be subsequently stored without problems of biological stability (fermentation, mold ..).

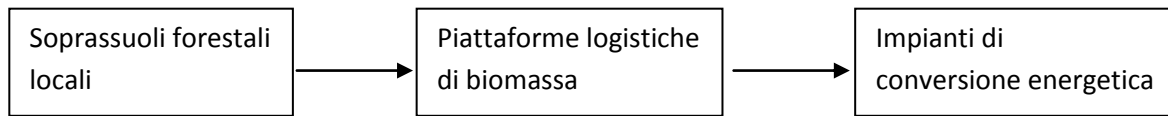
Several may be the types of timber storage; it will be possible to choose to use appropriate logistics platforms in which this wood chips will be covered with roofs or simply piled up as it is to roadside before being chipped later.



Produzione di cippato forestale dopo la stagionatura del materiale all'imposto e presso una piattaforma (da "Legna e cippato" AIEL, 2009)



The general pattern of the wood-chip-energy chain is exemplified in the following way:



In an area characterized by a strong infrastructure presence (Malpensa airport, Turbigo Boffalora Ticino thermo-electric plants, etc..) interventions for the rationalization of the relationship between supply and demand of energy can be very important for reducing energy consumption and hence also the environmental impacts deriving from them.

## **Bibliography**

AA.VV. (2006 a). "Let's collect the energy. Evasfo Evaluation Short Rotation Forestry. Innovation in mechanical harvesting of woody biomass." N. 54 - March 2006. Regione Lombardia - Agriculture. Agriteam. CNR-Ivalsa.

Land Agency - [www.agenziaterritorio.it](http://www.agenziaterritorio.it)

AGOSTINETTO L., BARELLA L., GIANNINI M. (2005). The European path of the wood-energy: the site of "Po di Tramontana". The wood chips chain in the Centro Sperimentale Ortofloricolo Veneto Po di Tramontana of Veneto Agriculture, in the municipality of Rosolina (RO).

AIEL –Italian Association of Energy Agroforestry - "Wood and wood chips", 2009

Consorzio Parco Lombardo della Valle del Ticino –“Strategic Environmental Assessment of the development programs of the transport system "DGR 8/675/2005 -2007

D.G.R 8/675/2005 – “Criteria for the conversion of forest and associated compensatory measures -"

D.G.R. 8/2024/2006 –" Applied aspects and details to the definition of forest, for the identification of irrelevant plant formations and to the identification of the coefficients of woodiness "

DE PAOLA C., - "Biofuels and territory" newsprint "Parco Ticino" Year 10 - Number 1 - September 2007, p. 12

MEZZALIRA G., BROCCHI COLONNA M., VERONESE M. (2003). How to produce energy from wood Notebook ARSIA 3 / 2003. ARSIA– Regional Agency for Development and Innovation in agriculture and forestry, Florence

RIVA G., ALBERTI M., DAL VERME M., "The energy balance of the Park" newsprint "Parco Ticino" Year 10 - Number 1 - September 2007 - pag. 8-9

Veneto Agricoltura - "The production of woody biomass for energy purposes - Technical details of the supply chain"